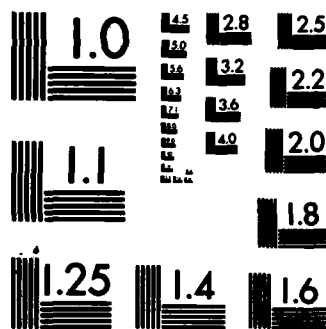


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CURV III (CABLE-CONTROLLED UNDERWATER RECOVERY VEHICLE) 1/1
CHARACTERISTICS AND MISSION APPLICATIONS(U) NAVAL OCEAN
SYSTEMS CENTER SAN DIEGO CA W W PERKINS ET AL. MAR 84
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Technical Document 651

CURV III

Characteristics and Mission Applications

W. W. Perkins
L. K. Brady

March 1984
Final Report

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NAVAL OCEAN SYSTEMS CENTER SAN DIEGO, CA 92152

AN ACTIVITY OF THE NAVAL MATERIAL COMMAND

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ADMINISTRATIVE INFORMATION

This document was prepared by the Naval Ocean Systems Center, Code 013, San Diego, CA 92152.

The information provided is in response to Public Law 96-480, Sec II, Part (a) - "It is the continuing responsibility of the Federal Government to ensure the full use of the results of the Nation's Federal investment in research and development. To this end the Federal Government shall strive where appropriate to transfer federally owned or originated technology to State and local governments and to the private sector."

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CURV III
POTENTIAL MISSION APPLICATIONS

INSPECTIONS

Deep-moored acoustic arrays.
Bottom-mounted equipment.
Deepwater cables.
Small area bottom surveys (photographic and video).
Sewage outfalls and deep-ocean dumping sites.

SUPPORT TO OCEAN ENGINEERING (TEST BED VEHICLE)

Underwater work systems

- Tools.
- Manipulators.
- Attachment devices.
- Lift devices.
- Collection and data sampling.

Evaluation of underwater photographic techniques and equipment.
Inspection/rigging of deepwater experimental stations.
Implantment and recovery of deepwater equipment.
Environmental data collection (geological and biological sampling).

SEARCH, SALVAGE AND RECOVERY

Search

- Sonar search and bottom mapping (1-2 sq mi area).
- Active sonar search.
- Passive sonar search (cooperative target).
- Transponder navigation and location.
- Video classification and documentation (dual TV with VTR capability).
- Photo documentation (35mm color).

Salvage and recovery

- Underwater rigging of large objects for salvage.
- Direct-lift recovery (up to 200 lb).
- Assisted-lift recovery (up to 2,000 lb).
- Attachment of lift lines or lift devices to large objects.

GENERAL CHARACTERISTICS

DESCRIPTION

The Cable-Controlled Underwater Recovery Vehicle (CURV) program was begun by NOSC for the specific purpose of developing economical systems to recover test ordnance at NOSC's Long Beach and San Clemente Island test ranges. CURV III is the latest in this series of tethered, unmanned, remotely controlled vehicles and its present capabilities far exceed the original CURV I. Originally conceived for use as a search and recovery vehicle, CURV has evolved into a versatile and easily adaptable multipurpose work vehicle capable of performing search and recovery tasks as well as pursuing test, evaluation, exploration, and work projects. Basically, CURV is a composite of integrated subsystems including such items as propulsion, search and navigation, optics, hydraulics, and tools. Because it is unmanned and does not require life support or other complex support systems, CURV is able to perform most undersea tasks more economically and efficiently than manned systems. Also, since it is powered and controlled from the surface, CURV has a continuous, unlimited operating capability. Under emergency conditions, the vehicle can operate to 10,000-foot depths. CURV can be easily transported to any spot in the world. Upon arrival of the vehicle, control van, cable, and support gear can be mounted on a suitable ship of opportunity.

VEHICLE

General

Size	6.5 ft x 6.5 ft x 15 ft
Weight	4,500 lb (approx.)
Operating Depth	7,000 ft
Crew	7 persons
Payload	200 lb max (vehicle only); 2000 lb max (with assist on strength member); 10,000 + lb (with separate surface recovery line)
Submerged Speed (max)	4 knots (estimated)
Operating Endurance	Unlimited
Power Requirements	(self contained)

Vehicle Subsystems and Components

Propulsion	Three 3-phase, 440 Vac, 10 hp, oil-filled, pressure-equalized motors with fixed pitch screws; thrust varied by voltage, max 400 lbs forward, 250 lb reverse each
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Search and Navigation Straza SLAD-603

- Active Sonar: CTFM 78-82 kHz, ranges 50 yd, 250 yd, 800 yd
- Passive Sonar: 45 kHz
- Transponder Mode: 50 yd, 250 yd, 800 yd
- Sonar Training Mechanism: Projector, hydrophone, receiver, and passive listening hydrophone; automatic scan 120° at 26°/sec, tilt \pm 15°
- Locator: Pinger with 36.5 kHz, 1.5 sec pulse interrupted by 37.2 kHz, 10 msec pulse
- Altimeter: Transducer 100 kHz, 100 msec pulse, ranges 0-10 ft and 0-100 ft, accuracy \pm 0.5 ft
- Compass: Gimballed ring-core, flux gate magnetometer

Optics Television Cameras

- Two Hydro Products solid state, standard scan vidicon cameras; water-corrected lens, 54° view angle, aluminum housing

Lights

- Four stationary, pressure-balanced thalium iodide 250 watt floodlights at front of vehicle; two 100 watt pressure-balanced mercury vapor spotlights mounted with TV cameras

Documentary Camera

- One EG&G 35mm color with 200 watt/sec strobe, 1 flash every 8 sec

Optical Pan-and -Tilt Units

- Hydraulically-actuated 360° pan, 90° tilt

Hydraulics Power Unit

- Oil-filled, pressure-compensated unit; 1.5 hp electric motor, .75 gpm pump; operating pressure 1,000 psi above ambient at all depths, 2 gal reservoir

Control Valves

- Marotta solenoid-controlled 3-way 2-position valves coupled in pairs to a blocking valve to give 4 positions

Actuators

- Linear: Racine hydraulic piston
- Rotary: Flo-tork

Tool Assembly Actuator

- Hydraulic five-function unit. Arm: UP-DOWN; Arm rotate: CLOCKWISE-COUNTER-CLOCKWISE; Arm eject. Wrist: CLOCKWISE-COUNTER-CLOCKWISE (axis 90° to arm); Claw: OPEN-CLOSE

Tools

- 13 in. claw, snare, grapnel hook, noose, marine organism basket, manipulator, Pyronol torch

Structural Components Buoyancy

- 50 3M Co. Syntactic foam slabs. Each slab: 5-3/4 x 11-3/4 x 22 in. (0.83 cu ft), 38 lbs/cu ft (26 lbs/cu ft buoyancy)
- Hydrostatic crush: 11,000 ft maximum
- Water absorption: 3% maximum, 2.1% average @ 4,500 psi

Total Buoyancy

- With approximately 70 lb forward lead trim, vehicle 40-50 lb buoyant

Frame

- Main structure, exclusive of brackets and bumpers, 6-ft wide, 4-ft high, 11-ft long of welded 6061 aluminum structural shapes

Interconnecting Cables Cables are pressure-balanced, immersed in oil inside flexible tygon tubing. Pressure-balanced connectors based on NUC designs.

MAIN CABLE

Length 10,000 ft
Diameter 1-1/2 in. O.D.
Weight 1.25 lb per ft in air, 0.6 lb per ft in water

SUPPORT AND POWER CONVERSION EQUIPMENT

Instrumentation Van 15 ft long, 9 ft wide, 8 ft high with air conditioner removed.
5 bay electronic control console:
Display
● Sonar, altimeter, depthometer, locator, vehicle tracker, TV monitors, vehicle and ship's compass (with cable twist counter)
Vehicle Operator Controls
● Propulsion, TV 35mm camera lights, claw
Sonar Operator Controls
● Sonar mode and range scan frequency, assist on TV on claw
Communication
● Ship intercom, radio remote station
Vehicle & Target Tracking Gear . BALD gear (directional hydrophone)
Instrument Power Conversion and Isolation Package ● One 5 KW motor generator.
● Three superior electric variable transformers for output of 1000V (max)

HANDLING EQUIPMENT

Cable Storage Bins Two bins 4 ft high, 4 ft wide, 14 ft long
Miscellaneous Spare parts van portable capstan, Boston Whaler

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